THE NATURE CONSERVANCY NEWS

FALL 1977

DEC 27 '77

ENDANGERED SPECIES

We're Building An Ark

It doesn't really look like Noah's ark, but it's the same idea. The Nature Conservancy is busy finding and protecting the wildlife and plants threatened now by a flood of development.

It is a big job, but since 1950, over 1.1 million acres have been preserved—home to millions of birds, animals, insects and plants, many rare or endangered. So far we have created more than 670 Conservancy sanctuaries.

The sanctuaries protect much more than wildlife. Consider: Many life-saving medicines originated in natural sources—penicillin, quinine, digitalis, streptomycin, aureomycin. The list is much longer.

There is every reason to expect future discoveries. Is a cure for cancer hidden in the chemistry of a tiny forest orchid?

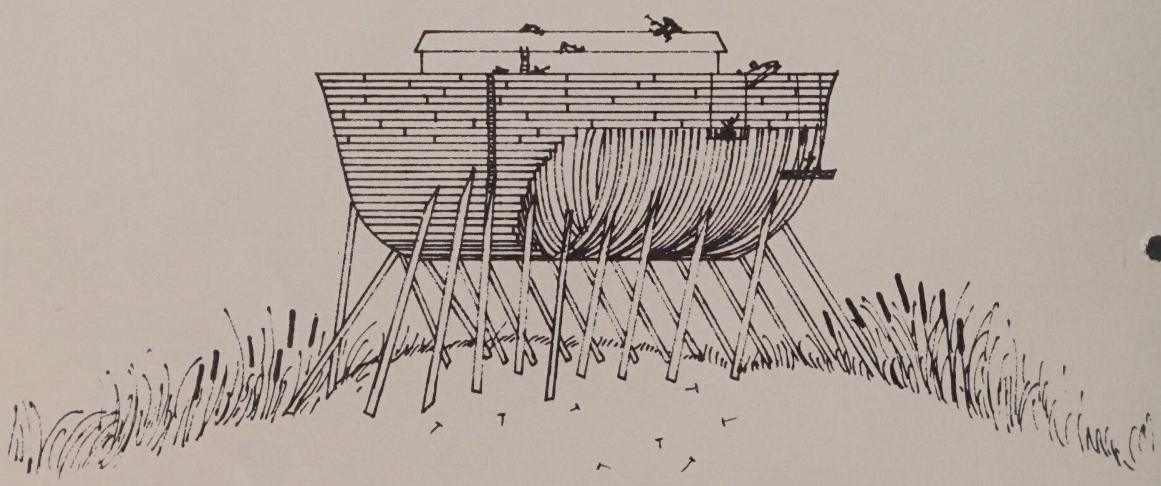
Wild grasses yielded wheat and corn. Even today, the wild strains help keep the domestic forms healthy.

But what about tomorrow? Does the secret of a new high energy food lie in the genes of a prairie grass? Without an ark we will never know.

Unfortunately, today, many species are unprotected, sanctuaries not created. Yet the rain clouds are gathering and we need to move quickly.

Researchers estimate that we now lose, for all time, one species each year.

So much is at stake. Help build the ark while we still have time. We owe it to Noah, ourselves, and the future.



Pick up a hammer and join us.

Give to the General Fund.

OFFICERS

CHAIRMAN OF THE BOARD
John E. Andrus III, *Minnesota*

VICE CHAIRMEN
Frank D. Boren, *California*
Thomas L. McCall, *Oregon*
Nathaniel P. Reed, *District of Columbia*

SECRETARY
Robert B. Anderson, *New Mexico*

TREASURER
Charles C. Haffner III, *Illinois*

BOARD OF GOVERNORS

John D. Archbold, *District of Columbia*
F. E. Balderston, *California*
Robert Bennett, *District of Columbia*
Helen Black, *Ohio*
William D. Blair, Jr., *Maryland*
Robert O. Blake, *District of Columbia*
Alexander Calder, Jr., *New Jersey*
Wallace C. Dayton, *Minnesota*
G. William DeSousa, *Connecticut*
William K. duPont, *Delaware*
John H. Filer, *Connecticut*
Richard H. Goodwin, *Connecticut*
R. Philip Hanes, Jr., *North Carolina*
Charles Hedlund, *New Jersey*
Kenneth E. Hill, *California*
Roy E. Larsen, *New York*
Dan W. Lufkin, *Connecticut*
Lyle M. Nelson, *California*
M. Graham Netting, *Pennsylvania*
John B. Oakes, *New York*
Eugene P. Odum, *Georgia*
Ruth Patrick, *Pennsylvania*
A. Timon Primm III, *Missouri*
Mrs. David Rockefeller, *New York*
Francis W. Sargent, *Massachusetts*
Stephen H. Spurr, *Texas*
Hubert W. Vogelmann, *Vermont*
Richard S. Weinstein, *Florida*
Mason Walsh, Jr., *Pennsylvania*
Mrs. Charles P. Yarn, Jr., *Georgia*

NATIONAL OFFICE

Patrick F. Noonan, *President*
L. Gregory Low, *Executive Vice President*
Robert E. Jenkins, *Vice President, Science*
David E. Morine, *V.P., Land Acquisition*
John R. Flicker, *Corporate Counsel*
Mark N. Beach, *V.P., Development*
William B. Carlin, *N.Y. Development Office*
Hadlai A. Hull, *Finance*
Thomas J. Fitzgerald, *Controller*
Ray M. Culter, *V.P., Land Stewardship*
Jack Lynn, *Communications*
R. Michael Wright, *International Program*

EASTERN REGION

Bradford C. Northrup, *Vice President*
Thomas L. Newman, *Mid-Atlantic Representative*
A. Dix Leeson, *New England Field Representative*

SOUTHEAST REGION

Riesley R. Jones, *Vice President*
Thomas Massengale, *North Carolina Field Office*

MIDWEST REGION

John W. Humke, *Vice President*
Dennis Wolkoff, *Indiana Field Office*
G. Rodney Miller, *Michigan Field Office*
Marshal A. Moser, Jr., *Ohio Field Office*
Martin Berg, *Minnesota Field Representative*

WESTERN REGION

Henry Little, *Vice President*
Spencer Beebe, *Northwest Field Office*
Daniel E. Pike, *Rocky Mountain Field Office*
J. Hamilton Tabor, *Hawaii Field Office*
Ken Margolis, *Oregon Field Office*

THE NATURE CONSERVANCY NEWS

Published Quarterly by The Nature Conservancy
1800 North Kent Street, Arlington, Virginia 22209
Sue E. Dodge, EDITOR
Anne M. Byers, Copy Editor

Volume 27, Number 4 **Fall, 1977**

ENDANGERED SPECIES

Conservation or Extinction? 4
A look at human attitudes and values in relation to species endangerment

Let Them Live 8
A sampling of endangered species that the Conservancy has worked to save from extinction

Endangered: The Endangered Species Act 19

Ecology Forum: "Endangerable" Species 20

New Projects 22
A review of projects begun in recent months

The American Land Trust: "Altamaha Splash" 27

Oak Leaf Awards 1976 28

Annual Meeting Notes 30

ON THE COVER: Immature bald eagle; pen and ink drawing by Walter Matia.
PHOTOS: Michael P. Gadomski, pp. 22, 24, 25, 26; Ray Culter and Jack Lynn, p. 30.

LAND CONSERVATION THROUGH PRIVATE ACTION

The Nature Conservancy is a national conservation organization, receiving its support from the public, whose objective is to preserve and protect ecologically and environmentally significant land and the diversity of life it supports.

To achieve this goal, the Conservancy purchases lands using its revolving fund which is then replenished through fund raising; accepts gifts of land; retains and provides stewardship for 60% of all projects; works with local, state, and federal governments to identify and protect important natural areas; and acquires and manages land in advance of government agencies' ability to do so.

Some 1,184,880 acres of forests, swamps, marshes, prairies, mountains, beaches, and islands in 1,860 projects throughout the United States have been saved from destruction by the Conservancy since the acquisition of its first preserve in 1954.

A member-governed non-profit organization, The Nature Conservancy was incorporated in 1951 in the District of Columbia for scientific and educational purposes.

ANNUAL MEMBERSHIPS

$1,000 Corporate (Minimum)	$100 Guarantor	$15 Family
	$50 Supporting	$10 Subscribing
	$25 Contributing	$5 Student

LIFE MEMBERSHIP

$500

Members receive the *News*.
Contributions to The Nature Conservancy are tax-deductible.

Copyright 1977
The Nature Conservancy

Conservation or

We live among weeds, and because these appear common we mistakenly assume that most life forms are common. It is just the other way. The great majority of all life forms are rare, and for that reason, vulnerable. We should notice, however, that their persistence to this day is evidence of considerable fitness.

Weed species—whether plant or animal—appear common because they are adapted to "new" or disturbed environments. Since man is the great disturber of environments, he enhances it for weeds. We are, also, most familiar with what is close at hand. Besides, we North Americans occupy a temperate zone which is among the newest of the planet's environments, since it has only recently been made available to colonization by the waning of a continental ice sheet. Mankind's explosion into this vacated landscape, in the last 20,000 years and less, suggests that man himself is a weed species.

There is no simple definition of rarity, although those species with highly localized populations, and those that are highly specialized in their life requirements, so that few habitats suit them, are bound to be rare. For a great variety of historical and biological reasons, this is the way it is with most species. Being localized or specialized is a hazard to continued existence when drastic environmental change occurs, be it an Ice Age or man's take-over of the landscape. Because man's take-over is both drastic and rapid, the threat of extinction now hangs over a majority of the world's terrestrial species as never before.

Since we know more about birds than other life forms, we can most quickly learn about trends by reviewing the ornithologist's knowledge of extinction in birds.

In the early 1960s, the late James Fisher of England developed a series of life-expectancy calculations for bird species, basing these on the fossil record and a current world population of about 8,500 full species. He found that prior to the Ice Age the average species might expect to exist for 1.5 million years. This is a long time, and it reflects the stability of the planetary environment during most of its history.

But we live in a time of upheaval, unusual enough in geological terms to be labeled a Climatic Accident. The last million years, the Pleistocene Epoch, was marked by an Ice Age, producing a continental ice sheet which advanced and melted back several times, with at least four major advances. This was disruptive enough to have lowered species life-expectancy to about 40,000 years. The American student of fossil birds, Pierce Brodkorb, has opined that bird species, which were at their peak of abundance before the Ice Age, may have been reduced by 25%.

Geologists call the last 10,000 years the Recent Period, and for this period Fisher's calculations suggest only 16,000 years of life expectancy for bird species. Since the Recent Period has been one of much ameliorated climate, at least compared to the Ice Age, it seems obvious that man is now the principal agent of extinction. It is true that extinction is a "natural" process, in the sense that it was operative long before man came on the scene, but Fisher's calculations dramatize the accelerated rate of extinction—applicable to all species, not just birds—that generated the modern conservation concern. In addition, the early extinctions were apparently often gradual enough to allow a replacement species to evolve; but today's extinctions are truncations without issue.

More specifically, when Fisher

Extinction?

by Roland C. Clement

reviewed the evidence a decade ago, 78 full species were known to have become extinct since 1680, of which 88% were island inhabitants. Man was directly or indirectly responsible for at least half of these extinctions, the other half being of undocumented demise. Direct extinctions are those caused by man's predation, whereas indirect losses are caused by man-created habitat changes and man's introduction of rats, cats, and other predators, especially on islands where small initial populations are particularly vulnerable to predation. The habitat changes are a result of man's preempting the surface of the Earth for himself—usually heedless of unnecessary disturbance—and of his ruthless exploitation of resources, such as the current "harvesting" of the tropical forests of the world.

But it does not suffice to identify man as the modern agent of extinction. Man is not just another geological factor. Some people unfortunately still argue that if we are part of nature, our preemptions of space are "natural," and the concern about resulting extinctions is irrational. This is a naive view which misses the fact that man is that part of nature which has, for the first time, become aware of its participation in the creation. This miraculous quantum jump in the evolutionary process produced the first sense of appreciation—and a resulting sense of responsibility—for the creative process and all its products. It is in this sense, as a call to affirm the universe, that the Psalm says: "Have leisure and know that I am God."

So we must ask why so many of us are still so heedless of this challenge and privilege to be the custodians of the creation. This is not the place to outline the history of Western Civilization to see where we were misled, but we must at least be awake to the fact that almost all environmental destruction problems are results of human attitudes. Our behavior is shaped by our attitudes, and these in turn are a result of the ideas we have accepted as descriptive of reality. It is because we believe so many things that are not so that we are in trouble.

Let us, however, question the most dangerous errors in order to begin undermining their domination of our lives, and thus open the way for more realistic views. Among these are the notion that man is not part of nature; that "land in the state of nature is wasteland" (Locke); that freedom is a function of possession, especially with reference to the possession of one's person and talents, with the consequence that it is believed one owes nothing to society (or the environment), and that only market (contractual) relations are valid obligations. Others are the notion that private greed will accrue to public good (Mills); that politics and economics are discrete fields of human activity; that "production" is generally constructive, rather than, as often, simply the liquidation of raw materials; that work (pro-

"Some people, unfortunately, will argue that if we are part of nature, our preemptions of space are 'natural,' and the concern about resulting extinctions is irrational."

duction *qua* production) is man's first duty and satisfaction; and finally, for now, that science provides a clear and sufficient picture of reality. This is of course not to say that there is no insight in any of these notions, but rather, that we have allowed them to substitute for thought for too long, and thus obscured other ways of appreciating our Earthly existence.

It should be noticed that the problems of the Third World, where so many threats to rare species are now focused, are in large part a reflection of the erroneous notions that have guided all of Western Civilization for too long.

Values

There are usually two questioning responses to the attempt to see our modern predicament in the round. People ask, "Why does it matter if a few more life forms are lost?" or they ask, more in resignation than in hope, "Can anything be done about it?" This is the central challenge to conservation organizations like The Nature Conservancy. It asks why we should make the effort to conserve habitats and the species they produce and nurture.

The answer to such questions is a matter of what we value. Unfortunately, this question of value is itself one of the most confused of our day. This cannot be corrected overnight, but we can hint at better approaches.

The growing concern about environmental destruction has focused increased attention on the need to define the values that species and ecosystems possess, either in themselves or for us. Helpful as it is in clarifying our notions, however, the discussion remains inconclusive mostly, it seems to me, because it has not yet questioned the underlying assumption of "possessive individualism" which has been the guiding principle of Western Civilization. This therefore leads to the assumption that we must appeal to short-term economic interests in appealing for nature conservation. The approach is one of cost-benefit analysis, an appeal to the pocket book. It overlooks that so long as attitudes give first place to what is economic, everything will in time be sacrificed to "production."

The Nature Conservancy's 1975 report on *The Preservation of Natural Diversity* is a good summary of current ideas in this area, but it is a first step. For example, it recognizes (p. 34) that men exhibit "a positive reaction to natural diversity," but it does not ask why this good instinct is so generally short-changed.

"The growing concern about environmental destruction has focused increased attention on the need to define the values that species and ecosystems possess, either in themselves or for us."

The professional economist remembers (sometimes) that he is abstracting from a larger reality when he says that things have value only as people are willing to pay for them. This means, for his purposes, that they have "economic" value. When we forget this—or do not know it—we make the mistake of taking the economist's abstraction for a general statement, and fall prey to the false notion that things have no value in themselves. This is not true. For two generations, also, philosophers have confused us by arguing that "ought," which is ethical and therefore hinges on value judgments, cannot be derived from "what is," i.e., from fact. They are at last coming full circle and admitting that this was an error.

Recently, David W. Ehrenfeld, writing in *American Scientist,* suggested that those things we value even though they may not be "economic," should be called non-resources. This unhappily introduces new jargon to correct the errors of older jargon. It seems simpler to remember that resources mean different things to different people, and to specify what we mean when we use the term.

Another recent approach is that of Walter E. Westman, writing in *Science,* who suggests that we should learn to quantify the services provided us by ecosystem functions as a measure of their value. For example, we have long known that nitrogen fixation by bacteria in the root nodules of leguminous plants is important to soil enrichment. We also know that carbon monoxide in the atmosphere retards this nitrogen fixation process. We may thus compute both the costs of air pollution and the economic value of the free goods produced by the ecosystem.

A few economists are even toying with the notion of Existence Value, i.e., a value people would be willing to pay for simply to know that something will continue to exist, without reference to the particular uses which might be made of that something. It seems increasingly obvious that all these refinements are gropings for ways to make people realize that economic behavior alone will end by destroying the world. A socially equitable decision must be based on a concept of man in his relation to nature, and there cannot be objective decision-making based on the notion of possessive

individualism, since this is irrational in denying the individual's social and ecosystem dependence, i.e., his obligations. We need another Social Contract!

A half century ago Alfred North Whitehead tried to show us how to value things, but we were then too busy with the new movies, bathtub gin, and jazz to pay him much heed. He warned that we must begin with value at the very root of things, else we may never find it. Instead of using "value" as a synonym for "price," or willingness to pay, we must learn to apply it to whatever has achieved a degree of status by the very process of coming into existence, and persisting therein.

Not until something becomes of value to itself, through satisfaction at achieving a degree of order, can it become of value for someone else. Things therefore have value in themselves. We must leave off reifying value, and study it in its basic form, as the process of becoming, the very foundation of all creation. It is the same with life, which we tend to view metaphorically and as it is exemplified in some particular, short-lived individual, instead of seeing it as a principal manifestation of the whole of nature. We over-intellectualize our knowledge, and in dealing with fragmentary abstractions we lose sight of the larger reality.

We must, then, begin by valuing nature as the tremendous accomplishment in evolutionary time it represents. It was not a once-for-all act of God. Nature is the concatenation of all the building blocks for all future evolution, whether physical, biological, artistic, intellectual, or spiritual. This is why extinction matters. It short-changes our future.

We may then ask where and how much surplus exists in particular ecosystems that we might transfer to human use in order to make mere existence easier, and thus free us to explore the relational adventures implied in our humanity. Having relearned the need to protect nature so as to safeguard our future, we will see the need of limiting human numbers. Beware of Eric Hoffer and Rene Dubos who would have us humanize the Earth; let us humanize man instead!

"We must, then, begin by valuing nature as the tremendous accomplishment in evolutionary time it represents."

What to do?

The leisure our economic and technological skills make possible is wasted when, as at present, it is turned to more production and consumption instead of to reconciling man with man, and all men with nature. The challenges are thus not economic but ecologic, not technological but social, and not possessive but relational.

Fortunately, for those of us who think this way, the system itself already shows many signs of being forced to turn around. This is why so many analyses are being provided. There appear to be tremendous undercurrents of change already in progress. We need to study them and facilitate those which promise constructive results. But the process of developing new values, and new ways of doing things will take time. Meanwhile, environmental destruction will continue and must be guarded against. How?

In our day, species protection depends on habitat protection. The best way to do that is to take the land off the market, by gift or purchase, or by getting the government (the people) to acquire it. This is what The Nature Conservancy was organized to do, and what it does better than anyone else. But necessary as habitat protection is, it is no longer sufficient unto itself. Species and communities may need to be managed to achieve important objectives. Nor should an acquisition program be *ad hoc*. It must be tailored to ecologic need, so that representative samples of as many as possible of America's habitats are preserved. Deserts and brushland may be as significant as the more glamorous mature forests in such a modern Noah's Ark program. Internationally, the Conservancy's assistance in creating new national parks in Latin America is a crucial contribution which complements the U.S. program, even if only because so many of the summer resident bird species of the United States winter there.

Although land acquisition has the advantage of being a specialized activity, it cannot long continue in a national-international land use policy vacuum. The challenge is that of integrating man's two worlds, i.e., the world we have built ourselves within the supportive world of nature. This task is more philosophical than scientific. We must therefore begin by questioning our assumptions, and ask about man's role in a continuing creation process.

Mr. Clement is a vice president of the National Audubon Society and Chairman, U.S. Section of the International Council for Bird Preservation (ICBP).

Let Them Live

A sampling of endangered species the Conservancy has worked to save from extinction

by Anne M. Byers
Illustrations by Walter Matia and Louise Schiller

". . . when the last individual of a race of living things breathes no more, another heaven and another earth must pass before such a one can be again."

—William Beebe (1906)

Our country is currently plagued by many forms of environmental deterioration. We pollute streams, lakes, and oceans; we plow up prairies and mow down forests; we drain swamps and marshlands; we deplete our energy resources with no thought for the future; we release noxious gases into the air; we spray pesticides over the countryside; we excessively kill animals for profit or "just for fun." If we act quickly, some forms of degradation, such as air and water pollution, can be stopped and reversed, to a certain extent. But no other kind of environmental destruction is so irreversible, so hopelessly complete and final as the loss of our native plants and animals. Dr. S. Dillon Ripley, Secretary of the Smithsonian Institution, predicted, "It is my personal estimate that in 25 years, somewhere between 75 or 80 percent of the species of living animals will be extinct." The extinction of species is forever. Period. No turning back.

Though there are many reasons for species loss —such as hunting and collecting, use of pesticides, introduction of exotic species—the main cause of the disappearance of plants and animals is the widespread disruption and destruction of their habitats. In recent years, The Nature Conservancy has recognized that the primary objective of preserving natural areas is to protect and maintain our diversity of species, particularly plants and animals that are rare and endangered. Only by safeguarding species' habitats can we hope to save them from total eradication.

California Condor

Probably one of the rarest and most severely endangered animals in the country, the California condor is a magnificent bird with a nine-foot wing span. It can fly as high as two miles and range as far as a hundred in a day. In the 1800's, Lewis

and Clark saw great numbers of the birds. Now *Gymnogyps californianus* is becoming extinct. Once ranging from Canada to Baja California, only 45 condors now remain in the entire world, all nesting in the wild coastal range of southern California. Its greatest decline has occurred in the last century, and it appears to have been reduced by about a third since the early 1950's. Five were lost in the past five years alone.

Preserving habitat—areas of high mountain cliffs for nesting, where there are also strong air currents or thermals that enable the heavy bird to leave the ground—is a prerequisite to saving the condor. In 1971 the Conservancy assisted the U.S. Forest Service in acquiring a rugged, inaccessible area in the Los Padres National Forest. Though condors usually nest in an area for only two years, the 162-acre sanctuary was the site of a nest that had been used for four years.

But loss of habitat is only one problem afflicting the great birds. Besides being wantonly shot, the condor is becoming extinct because it is losing its food supply. It feeds only on the carcasses (never on live prey) of large herd animals, such as cattle, sheep, and deer. As deer have disappeared and ranches in the southern California valleys have switched from cattle or sheep raising to crop production, the bird's sustenance has vanished. In a "last ditch" effort to save the condor, ornithologists and other scientists from the National Audubon Society, U.S. Fish and Wildlife, the U.S. Forest Service, the Bureau of Land Management, and the State's Department of Fish and Game have formed the California Condor Recovery Team. Its members keep track of the birds, determine which are nesting and where, educate the public, manage areas that support condors, and rescue injured birds. In addition to recommending that grazing lands be maintained, the team has advised that only captive breeding will now save the condor. Since there are so few birds left, captive propagation is a controversial alternative, and may not even be possible. But it may be our last chance to halt the demise of the California condor.

Manatee

A shy, gentle creature, the manatee or sea cow is believed to share a common ancestry with elephants, dating back 50 million years ago to the Eocene period. The Florida manatee (*Trichechus manatus*) is one of three living species of sea cows. All are endangered throughout their ranges. A fourth species, the giant Stellar sea cow, was exterminated by food-seeking sailors and whalers in the late 18th century, only 27 years after it was first discovered in the Bering Sea. Along with their cousins, the dugongs, manatees are the only totally herbivorous aquatic mammals; hence, the name sea cows.

Once ranging along the coast from North Carolina to Mexico, the Florida manatee has been reduced to between 600 and 1,000 animals widely scattered around the Florida peninsula. Though these are now protected by the Marine Mammals Act of 1972 and the Endangered Species Act of

1973, habitat destruction, pollution, illegal hunting, human molestation, and boating accidents keep the species on the verge of extinction. Obviously, legislation alone will not save the manatee. Even the $500 fine levied by the State of Florida has not deterred some poachers.

Hopefully, two events have improved the manatee's chances for survival. On September 21, 1976, the Interior Department's U.S. Fish and Wildlife Service published a final rulemaking that lists the areas which must remain undisturbed if the sea cow is to survive at all, and designated the areas as critical habitats. The rule went into effect on October 22, 1976. During the same month that the list was released, the Hobe Sound Company donated 500 acres on Jupiter Island, lying not far from the Florida coast's heavily traveled U.S. Highway 1. Contributed to the Conservancy and

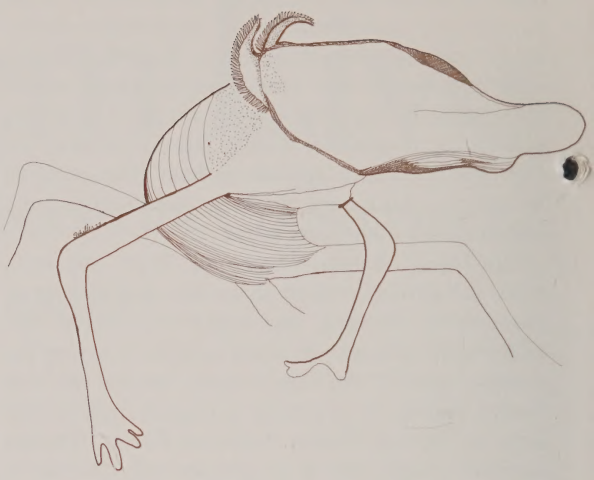
endorsed by the American Land Trust, the area shelters manatees as well as the largest colony of nesting sea turtles in the U.S. The Conservancy transferred 490 acres to the U.S. Fish and Wildlife Service for inclusion in the existing Hobe Sound National Wildlife Refuge. The remaining 10 acres were transferred to the Town of Jupiter Island.

Indiana and Gray Bats

The Conservancy has preserved four areas, three in Illinois and one in Wisconsin, that provide habitat for two officially endangered bats, Indiana (*Myotis sodalis*) and gray (*Myotis grisescens*). Like all native insectivorous bats, populations of both these species have been reduced to about 10 percent of their original numbers. The most drastic decreases have occurred since 1950. Though numbering several hundred thousand, both bats are endangered because they are losing the special kinds of caves in which they can hibernate during the winter. They require caves that have a very precise combination of temperature and relative humidity.

The needs of the Indiana bat are a bit more crucial, since the perfect atmospheric conditions for this species are limited to a narrow zone near the cave's entrance. Therefore, the Indiana bat is also more vulnerable than species that hibernate deeper inside the cavern. Any disturbance that might alter these conditions, such as flooding, urbanization, explosions from quarrying activities, and campfires, is more likely to originate from outside the cave. Bats hanging near the entrance would be the first to suffer. Furthermore, when entering hibernation, insectivorous bats are laden with fat deposits that enable them to survive the winter. But if they are disturbed, even minimally, the bats will waken, use up the energy resources that must be held in reserve, and die.

Between human disturbance, destruction of vital caves, pesticides, and vandalism, both the Indiana and gray bat stand a slim chance of survival. Various organizations have recommended procedures for saving the species, such as fencing off caves known to contain the bats, limiting the banding of bats, and requesting that researchers and biologists limit their cave visits to once a year. The National Speleological Society has instructed its members to avoid important caves during critical periods. The public must learn that the majority of bats in the U.S. perform the very useful function of controlling insect populations. Banning pesticides has also been recommended. Since the Environmental Protection Agency banned almost all uses of DDT, Park Service officials at Mammoth Cave in Kentucky have reported an increase in their numbers of Indiana bats.



Texas Blind Salamander

As if to substantiate the delicate interdependence and balance between species, the decline of bats is, in turn, one factor causing the gradual extinction of another cave dweller, the highly rare Texas blind salamander. As bats have disappeared from the very few caves harboring *Typhlomolge rathbuni,* so too has the bat guano that serves as the basis of the food chain which feeds the endangered amphibians. Other reasons for their dwindling numbers include the capping of artesian wells from which the salamanders are believed to originate, sealing up cave entrances, draining or polluting underground water sources, and overcollecting by biologists and professional rare animal dealers.

In 1967, after several years of frustrating negotiations, the Conservancy was able to acquire Ezell's Cave, Texas, one of only six such caverns known to exist. Thirty-six species of fauna are believed to live in the cave's small mysterious subterranean world. Of these, six, including the Texas blind salamander, are endemic to the cave and occur nowhere else in the world. Because the animal populations of Ezell's Cave have been drastically reduced, steps have been taken to restore the habitat by replenishing the guano base of the food web within the cavern.

Bald Eagle

In 1873 the bald eagle was chosen as our country's national symbol because it represented strength, dignity, and freedom. Today the majestic bird seems much less unconquerable. Not only trapped and hunted, the eagle also is being destroyed by a variety of deadly pollutants. Introduced chemicals, such as persistent pesticides and polychlorinated biphenals (PCB's), used for crop

protection, are rushing *Haliaeetus leucocephlus* ever closer to extinction. (Studies have shown that both substances are never eliminated and will persist in the environment almost indefinitely.) Stored in body tissues, the chemicals accumulate in larger and larger amounts through each successive step of a food chain, rising to higher and higher levels of concentration and deadliness. Because the eagle is at the top of a long food chain, the chemicals produce devastating and permanent effects. They attack the nervous system, causing agonizing death, and destroy the bird's ability to reproduce. The poisons make the eagle's egg shells so thin that the great majority of eaglets die before they can hatch.

While shootings, trappings, and poisonings of eagles continue—despite the threat of heavy fines and jail terms for offenders—the future of our national bird has been threatened even more by the almost irreversible loss of its habitat. Excluding Hawaii, there were once abundant populations of bald eagles in every state in our country. "Now," according to John Turner, a zoologist and authority on eagles, "only about 10 states still have in excess of a dozen active adult pairs." A National Audubon Society study, conducted in the early 1960's, showed that perhaps 550 to 600 adult pairs of eagles remain in the lower 48 states, and probably only 30 to 40 percent of these are still able to produce young. Several government and private agencies are conducting investigations into pesticide and chemical contamination of eagles, while the protection measure most often proposed is to acquire and safeguard habitats. The Conservancy has been highly successful in preserving areas that support bald eagles: Mason Neck, Virginia; Blackwater National Wildlife Refuge, Maryland; Cedar Glen Eagle Roost, Illinois; Skagit River Bald Eagle Sanctuary, Washington; Santee Coastal Reserve, South Carolina; and Hobe Sound and Crescent Lake in Florida.

Delmarva Fox Squirrel

Once distributed from extreme southeastern Pennsylvania, down Delmarva Peninsula to Northampton County, Virginia, the Delmarva fox squirrel (*Sciurus niger cinereus*) is now found in only four counties of the Peninsula. Declining rapidly, its total numbers are between 500 and 1,000. One reason for its endangered status is that the fox squirrel is nearly the color of the common Eastern gray squirrel. Hunters often cannot differentiate between the two species. Besides indiscriminate hunting and poaching (the State of Maryland banned hunting them in 1971), the animals are losing their habitat to real estate and agricultural development. Fox squirrels prefer large stands of mature loblolly pine and pine mixed with hardwoods, all of which were heavily cut during the 1880's and still are being removed today. Few tracts of mature timber remain anywhere within the squirrel's present range. A further problem is that the prolific gray squirrel is competing for the fox squirrel's remaining habitat.

What remains of the squirrel's dwindling population is centered near the Blackwater National Wildlife Refuge. Early last spring, under the auspices of the American Land Trust, The Nature Conservancy acquired an additional 2,530 acres (1,680 purchased immediately and 850 optioned for acquisition later this year) for inclusion in the federally protected area. The new tract adjoins Blackwater on the east and edges Maryland's Taylor Island Wildlife Management Area on the west. Prime habitat for Delmarva fox squirrels, the additional land supports large loblolly pines with diameters of more than two feet.

Red-Cockaded Woodpecker

Old-growth pines are even more crucial for the survival of the red-cockaded woodpecker, which also is believed to reside in the Blackwater National Wildlife Refuge. The bird is found in open pine forests, nesting only in two or three species of pine which generally must be more than 70 years old and afflicted by a disease called redheart. The fungus makes the trees chip more easily, so the pines are ideal for woodpecker excavations. *Picoides borealis* is endangered because of continued removal of old pines. In a 1976 report, the Red-cockaded Woodpecker Endangered Species Recovery Team summed up the situation: "Contemporary forest management tends to harvest mature natural stands, shorten rotations, and remove cavity trees and diseased or defective trees that are of potential use to the woodpecker."

Some federal and state agencies have taken protective measures that include saving old trees afflicted with red-heart in areas where red-cockadeds are known to occur. However, since a pair of woodpeckers may require as much as 40 to 45 acres of timber, sizable tracts of pines surrounding nesting trees must be left intact and large areas of land managed to provide necessary habitat requirements.

Besides preserving land in Maryland, the Conservancy has acquired other areas that are reported to harbor the endangered bird, such as South Carolina's Santee Coastal Reserve, Savage Gulf, Tennessee, and Chowan Swamp in North Carolina. Just recently, the Conservancy obtained an option to purchase another area in North Carolina called Weymouth. About 170 acres of the 200-acre tract support the state's last known stand of old-growth longleaf pines, which provides habitat for three colonies of red-cockaded woodpeckers. Ossabaw Island, Georgia, also optioned for purchase, provides habitat for the woodpecker, as well as for three other officially endangered birds: southern bald eagle, brown pelican, and peregrine falcon.

Mississippi Sandhill Crane

Small populations of sandhill cranes once occurred along the Gulf coasts of Alabama, Florida, Louisiana, and Mississippi. Only the Florida and Mississippi groups still exist. The Mississippi crane (*Grus canadensis pulla*) was not recognized as a distinct and separate sub-species until 1972. Darker than their Florida cousins, the Mississippi sandhill cranes are confined to about 80,000 acres near Ocean Springs and Fontainbleau in Jackson County. Only about 10,000 acres of this area are still ideal crane habitat. Individual cranes now number even less than California condors—38 to 40 birds are believed to be left. A meager 10 to 15 breeding birds were reported in 1975.

Silviculture, urban and suburban growth, and highway construction have destroyed the crane's habitat. Since the mid-1950's, thousands of acres of grass savanna and wet pine have been destroyed and replanted in slash pine. The access roads constructed to reach the new forestlands have brought hunters and tourists, pollution of the surrounding air and soil, and housing developments. Unlike most other members of the crane family, the Mississippi sandhill crane does not migrate; therefore, the bird's survival can be assured only by preserving its Mississippi habitat.

In 1972, the U.S. Fish and Wildlife Service authorized the establishment of the Mississippi Sandhill Crane National Wildlife Refuge in Jackson County. The Nature Conservancy, at the request of Fish and Wildlife, took the first step in 1975 by purchasing 1,708 acres within the pro-

posed refuge. The acquisition gave the crane a foothold, but it is a very tenuous one, since the birds continue to be threatened by increased highway construction and suburbanization. Only two months ago, however, the Conservancy acquired an option for an additional 6,029 acres, which represents 60 percent of the wildlife refuge. Owners of the land, the St. Regis Paper Company, will donate 936 acres and the Conservancy will purchase the remaining 5,093 acres.

Desert Pupfish

As pure examples of evolutionary divergence, the desert-dwelling pupfish can be compared to the unique Galapagos Island finches. During the Ice Age of the late Pleistocene, a vast system of freshwater lakes and rivers covered the land from Nevada to Mexico. When the Ice Age ended, the climate grew warmer and rainfall decreased. Consequently, the lakes and rivers gradually shrank, leaving only very small bodies of water scattered throughout what is now Death Valley of Nevada and California. The killifish that inhabited the Pleistocene waters were dispersed and isolated in separate microhabitats where they evolved to adapt to their greatly reduced, harsher environments. Their surviving descendents, the desert pupfish, comprise five species and six subspecies, all existing in perhaps three dozen widely separated springs and creeks. (Four other forms of pupfish and possibly a fifth have become extinct during the past 23 years because their habitats were destroyed.) Each is different, endemic to the body of water in which it evolved. Some live in water that ranges in temperature from near freezing to over 100 degrees, while others survive in waters that are six times saltier than sea water, an environment that would kill any other fish species.

The desert pupfish has survived several thousand years, adapting to a drastically changed and severe environment. Now its existence is threatened, not by natural evolutionary forces, but by human interference. Its habitats have been disrupted or totally destroyed; predatory fish have

Endangered Species Protected Through the Conservancy's International Program

In a recent issue of the *Natural Resources Defense Council Newsletter,* Dr. Norman Myers said, "There may well be as many as ten million species on earth . . . nine out of ten exist in the tropics, and at least two million, conceivably as many as four million, live in the tropical moist forests. . . . If present land-use patterns continue, little of these forests will remain by the beginning of the next century, except in grossly degraded form."

In cooperation with World Wildlife Fund and Rare Animal Relief Effort (RARE), The Nature Conservancy, through its International Program, assisted the Costa Rican government in establishing the Corcovado National Park on the Osa Peninsula. The 86,485-acre park is one of the largest protected undisturbed rain forests in Central America and represents a concentration of natural diversity matched by few other places on earth. Six species of cats, classified as endangered on the official international list of threatened animals, find refuge in the park: jaguar, Costa Rican puma, ocelot, margay, jaguarundi, and tiger cat. The spider monkey, howler monkey, and red-backed squirrel monkey—also endangered—inhabit the high forest canopy. Other endangered animals include harpy eagle, brown pelican, caiman, American crocodile, hawksbill sea turtle, leatherback sea turtle, and the Central American tapir. Approximately 287 species of birds have been identified in the park, including significant numbers of scarlet macaw whose populations have declined drastically everywhere else in the world. Corcovado is managed and protected by the Costa Rican National Park Service.

In 1947 John D. Archbold donated a 950-acre tract of pristine tropical rain forest on Dominica to the Conservancy. Lying midway in the 1,000-mile chain of islands stretching from the Virgin Islands south to Trinidad, Dominica is known as the "nature island of the Caribbean." Of the tiny country's 135 species of native birds, two are endangered: the Sisserou, or imperial parrot, and the red-necked parrot. Several animals are endemic to Dominica: four lizards, three snakes, three birds, two bats, and a frog.

The Archbold Preserve has been leased to the Dominican government for management as part of an adjacent 16,000-acre national park.

been introduced into pupfish creeks and ponds; pumps for irrigation wells have lowered habitat water levels, which are vital for the fish's survival; pesticides have entered some of the vulnerable areas; and, ironically, increased publicity has brought hordes of rare animal collectors. All species and subspecies of the desert pupfish are now endangered.

Confined to the warm springs of Ash Meadows in the Armargosa Desert, the Nevada pupfish (*Cyprinodon nevadensis mionectes*) numbers somewhere between 50 and 20,000, depending on whether a count is made during the breeding season or during a low-water period. They exist in about 10 pools. In 1973, the Conservancy was able to acquire one of the pools, Big Springs, which has been described as one of the most beautiful of all pupfish habitats. Its waters are clear all the way to the bottom, some 30 feet below the surface.

Desert Bighorn Sheep

The future of the peninsular or desert bighorn sheep (*Ovis canadensis cremnobates*), listed as rare by the California Department of Fish and Game, was made a little more secure in 1976 when the Conservancy completed the third in a series of transactions to acquire and preserve 26 square miles of land in the Santa Rosa Mountains of southern California. Almost half of the state's desert bighorn population inhabits the dry, rugged mountain range. The 12,639-acre Santa Rosa Mountains Bighorn Sheep Preserve is now being administered by the State of California.

Although the desert bighorn has been protected from hunters by state law since 1873, the animals had completely disappeared from northern California by 1920. In 1971, the Department of Fish and Game reported that 971 sheep remain—an estimated 10 to 20 percent of their original numbers. In addition to continued poaching, peninsular bighorns are afflicted by loss of water supplies and disruption of habitat. As the Santa Rosa Mountain range has become a popular site for vacation retreats and second homes, large amounts of the sheep's natural range have been destroyed, and existing springs have been dammed and channeled for human use. Bighorns cannot withstand even minimal disturbance, human or otherwise. When confronted by feral burros, whose numbers are increasing, the shy sheep will give way to the burros at their own scant watering holes. Only solitude, a sufficient water supply, and ample space will save California's remaining desert bighorn sheep.

Prairie Chickens

America's four prairie chickens have not fared well. There are two species of the unique birds—the lesser and the greater, the latter of which encompasses three subspecies: the northern greater prairie chicken, Attwater's prairie chicken, and the heath hen. The heath hen, which inhabited the mid-Atlantic coast, was last seen on March 11, 1932. Though doing a bit better than its cousins, the northern greater prairie chicken is still classified as rare (it has been extirpated in five states) and Attwater's prairie chicken, never widely distributed, is listed as endangered. The lesser prairie chicken has been teetering on the brink of extinction since the 1930's; it has been much reduced or eliminated from large portions of its former range. Our three remaining prairie chickens are declining because broad expanses of undisturbed grasslands have been converted to cropland and pasture.

The decline of both northern greater and Attwater's prairie chickens has been severe and very rapid. In Indiana, for example, the population of greater prairie chickens (*Tympanuchus cupido pinnatus*) reported for 1912 was around 100,000 birds; 29 years later only about 1,000 remained; 10 chickens were counted in 1969; today there are none in that state. A century ago, about a million Attwater's prairie chickens (*Tympanuchus cupido attwateri*) ranged along the Gulf coasts of Texas

and Louisiana. They vanished from Louisiana around 1919 and are now almost gone in southeastern Texas. The population count for 1971 was 2,200, whereas a 1937 survey reported 8,700 birds. In 1965, the same year that then Secretary of the Interior, Stewart Udall, issued a report listing Attwater's as fourth on a list of 50 U.S. animals and birds facing extinction, the Conservancy assisted the World Wildlife Fund in acquiring and preserving some 2,267 acres of virgin prairie in Texas. The sanctuary is one of only two areas left in the world harboring Attwater's prairie chickens.

The Conservancy's success in saving the northern greater prairie chicken has been outstanding. To date, the Minnesota Prairie Chicken Preserve System contains 12 prairie preserves, encompassing 5,634 acres. One of these prairies, Twin Valley, was acquired last year. It is centrally located within Minnesota's current prairie chicken range and provides a key link in maintaining an even distribution of the species along its entire range.

A recent study (June, 1977) completed by the Missouri Department of Conservation found that the Conservancy's 11 prairies in that state have three active prairie chicken booming grounds and a total of 30 male prairie chickens; 9 more booming grounds exist within a half-mile of the prairies and have 80 cocks. (Numbers of hens are too irregular to be counted; but during the peak of the breeding season on a booming ground, it can be surmised that there are at least 45 percent as many hens as cocks.) These population counts are higher than those for 1976.

Florida Panther

Our country's only large native cat will never again be common in the southeastern U.S. When white settlers landed on America's shores, the Florida panther (*Felis concolor coryi*) roamed as far west as Texas, throughout Florida and the deep South.

In recent years, population counts for the Florida panther have been anywhere from 50 to 300. But the preliminary findings of the Florida Panther Recovery Team, which is funded by the National Wildlife Federation through the Florida Game and Fresh Water Fish Commission, show that these numbers have been vastly overestimated. For the past year, members of the team have searched every possible panther habitat in the State of Florida. Only one place investigated definitely has a small "population" of panthers—exactly two animals. Tracks of two different cats were found in a swamp located just above the Big Cypress National Freshwater Reserve in Collier County. (The state is currently acquiring the swamp.) Furthermore, the team's "clearing house" for reported sightings has shown that most reports cannot be believed, even from reliable sources. When tracks were investigated that were purported to be those of a panther, they usually belonged to an otter, bobcat, or dog. A member of the team said, "We feel lucky that we've even found what could be called a local population."

Members of the Florida Panther Recovery Team have recommended that areas known to harbor the endangered cats be acquired and preserved and, since the animals are far-ranging, that land within a 15 to 20- mile radius of refuges be protected as well. The Nature Conservancy has preserved a large area in Mississippi that is reported to harbor the Florida panther—the 32,000-acre Pascagoula lowlands. Also, the Conservancy continues to assist the National Park Service in acquiring additional land for the Big Cypress National Freshwater Reserve, ideal habitat for Florida panther. Further recommendations for saving the cats include establishing the best possible management practices to increase deer herds—the prime prey of panthers. The public should be encouraged to change its attitude toward the maligned animal. Stories labeling the panther as a menace to cattle

and sheep herds are highly exaggerated, for the cats, like wolves, actually prefer wild quarry. A study conducted in the southwest on another subspecies, the mountain lion, has shown that the puma helps keep wild herd populations strong and under control by preying only on weakened and disabled deer.

Boggs Lake Plants

In the Smithsonian Institution's *Report on Endangered and Threatened Plant Species of the United States*, presented to the U.S. Congress on December 15, 1974, S. Dillon Ripley said, "All animals are dependent on plants for food and sur-

vival. Once a species of plant is extinct, the potential contained in that germ or gene pool is lost forever. A diversity of plant species is required to supply human necessities and to maintain an ecological stability in the biosphere." The report contains lists of 100 extinct plant species, 761 endangered plants, and 1,238 threatened species—about 10 percent of the flora in the continental U.S.

Boggs Lake, preserved by the Conservancy in 1973 through a 104-acre donation from the Fibreboard Corporation, is one of California's most unusual ecosystems—a vernal pool. Depressions in the ground that are filled up by winter rainfalls, vernal pools were once scattered across the state's Great Central Valley, but have disappeared as the rich valley was leveled and developed for agriculture. Boggs Lake is one of the few remaining vernal pools in the area—a rare jewel that can cover as much as 100 acres after a winter of heavy rains. Rings of brightly colored flowering plants encircle the lake, springing up in succession as the lake's waters recede through the spring and summer months.

The pool's flora is a distinctive and highly localized community that has adapted to survive the area's extreme seasonal variations in moisture. A further reason for the unusual vegetation of Boggs Lake is the surrounding outcroppings of serpentine rock, a type of metamorphic rock having a very low mineral content. The serpentine-derived soil is so nutritionally poor and easily leached that very few plants can germinate in it. Three plants, however, have evolved adaptations that allow them to withstand this severe condition: a species of hedge-hyssop, *Gratiola heterosepala*; a variety of dodder, *Cuscuta howelliana,* which is parasitic; and the many-flowered navarretia (*Navarretia plinetha*). The navarretia, a member of the phlox family, produces blue flowers in a clustered head. During very wet years, the rare plant grows so abundantly that the area looks like a blue lake. Although the three plants flourish in the low-mineral soil, they exist nowhere else in the world; consequently, all three are listed as endangered in the Interior Department's *Federal Register* of proposed endangered and threatened plant species.

Small Whorled Pogonia

A unique and highly interesting plant, the small whorled pogonia (*Istoria medoloides*) is a little yellowish-green orchid that occurs in mixed hardwood forests. The orchid's most unusual feature—and one which makes it more difficult to preserve—is that it has one of the longest resting periods of any eastern orchid. It may remain dormant underground for at least 10 to 20 years, during which time it sends up no leaves or flowers.

According to Dr. Carlyle Luer, the small whorled pogonia may be the rarest of the orchid species east of the Mississippi River, excluding Florida. Dr. Harold Rickett further recorded, in 1974, that it is one of the most uncommon plants in the U.S., so unusual that few botanists have ever seen it. The plant is threatened not only by destruction of its habitat, but also by ruthless orchid collectors. The endangered pogonia occurs within the planned assemblage of a Conservancy preserve in upstate New York.

Lignum-vitae

Because of its tropical and subtropical climate, Florida supports a myriad of plant life and, for the same reason, draws more and more people to its already densely populated shorelines. The confrontation between the state's native flora and human beings has created a long list of rare, threatened, and endangered plants. Ten percent of Florida's plants are in danger of extinction. One of these, the threatened Lignum-vitae tree (*Guaiacum sanctum*), was being cut down as early as 1500. Up until the 1700's, the trees were shipped to Europe where its resins were extracted for medicines used to treat tuberculosis, rheumatism, syphilis, scrofula, and other illnesses. Since the wood from the trees is also known as being the hardest in the world, it was used for a wide variety of items in homes as well as on ships. Europeans had aptly named it the "tree of life."

The scarcity of Lignum-vitaes was first recorded in 1769 by Bernard Romans when he surveyed the

vegetation of the Florida coast. After the late 1700's, the trees continued to disappear as more and more people settled in southern Florida. Formerly ranging throughout most of the Florida Keys, they have vanished or are rare there as well. In 1971, however, the Conservancy and the State of Florida purchased Lignum Vitae Key, which supports the largest known stand of the threatened trees, including one estimated to be over 1,000 years old.

A Special Case: Hawaii

The continental United States is by no means alone in its loss of native flora. In an article in the October 1975 issue of the *National Parks and Conservation Magazine,* Dr. F. R. Fosberg, Curator of Botany at the Smithsonian Institution's National Museum of Natural History, said, *"Seventy percent* of Hawaii's species of plants are in danger of extinction." If this seems difficult to believe, a review of the historical and continued devastation of the Hawaiian Islands will explain the statement.

Our 50th state's only native terrestrial mammal is the Hawaiian hoary bat, also an endangered species. Consequently, Hawaii's vegetation evolved without such protective features as briars, thorns, stinging hairs, poisonous properties, or resilient root systems—unlike plants that developed in areas where large plant-eating animals were present. When goats and pigs were introduced in 1778 and then sheep and cattle in 1793, the islands' flora were defenseless against the browsing and trampling of the large herbivores. In addition, Hawaii's lush tropical forests, opened up by grazing and then cutting for development, were invaded by non-native plants. According to Dr. Fosberg, "The impact on the vegetation was catastrophic, so much so that it is now almost impossible to know the exact nature of the vegetation that covered large areas (of the islands) in pre-European times."

Through his extensive studies of Hawaiian flora, Dr. Fosberg compiled a list of 1,765 plant species and subspecies that are either extinct, endangered, or threatened. Of these, 1,088 were included in the Smithsonian's *Report on Endangered and Threatened Plant Species.* In searching for solutions to stop this incredible loss of Hawaii's native vegetation, Dr. Fosberg said, "No plant can survive without a suitable habitat."

On the Island of Maui, between Haleakala National Park and the southeastern ocean coastline, lies the hidden Kipahulu Valley—a lush tropical rain forest serenaded by cascading waterfalls and shrouded in mist. Rising 7,000 feet above the ocean floor, Kipahulu is the wildest region left on Maui. Nearly 90 percent (some 220 species) of its higher plants are native, a phenomenon in the Hawaiian Islands where about 50 percent of the plants in its national parks are introduced species. Kipahulu contains virgin tropical rain forest, a forest of giant koa trees, and an almost impenetrable forest of ohia lehua trees. To date The Nature Conservancy has preserved some 4,625 acres of the 9,000-acre valley. In 1967 the Conservancy sponsored a month-long expedition into the remote wild area.

Maui parrotbill

At one time the Hawaiian Islands had 130 or more species of world famous woody lobelias. Large numbers of the giant flowering plants, unique to Hawaii, have become extinct in recent years. Dr. Charles H. Lamoureaux, the botanist with the Conservancy expedition, and his staff found some 17 different species of lobelias in the Kipahulu Valley. In summarizing his botanical exploration of the area, Dr. Lamoureaux wrote, "Elsewhere in Hawaii today it would be nearly impossible to find this many undisturbed (plant) communities in such close proximity. Since most of the Hawaiian species of plants are endemic, these communities are like no others, and Kipahulu in this sense offers an opportunity (for research) not available elsewhere on this planet."

Hawaii's birds are ecologically dependent upon the islands' native plants. Today 23 of the 67 known species and subspecies of endemic birds, which had taken thousands of years to evolve, have become extinct. Of the remaining 44 native species, 29 are endangered and many are bordering on extinction. Probably the greatest "find" of the Kipahulu expedition was the discovery of the Maui nukupuu (*Heminagthus lucidus*), a small honeycreeper with a long down-curving bill and

Endangered Species and the Conservancy's Preserve Data Bank

What do the Delmarva fox squirrel of Choptank Wetlands, Maryland, the Texas blind salamander of Ezell's Cave, Texas, the hedge-hyssop of Boggs Lake, California, and the southern bald eagle of Cedar Glen, Illinois have in common? Answer: they are all on the Federal Endangered or proposed Federal Endangered Species List, and they all reside on preserves managed by The Nature Conservancy.

As part of the 1982 Plan, which calls for completed Master Plans for Stewardship of Conservancy preserves by 1980, an inventory of available management, legal and scientific data—including information on endangered, rare and threatened flora and fauna—is now being conducted at the National Office. The year-long project is funded by a grant from the Weyerhaeuser Family Foundation, Inc., and may continue through 1978 if additional funding now being sought is secured.

Acquisition and enlightened management of areas in which endangered flora and fauna are known to occur deserves high priority. Without a comprehensive up-to-date inventory of ecological elements on Conservancy preserves, it is many times impossible to determine what endangered species presently exist, or to verify an occurrence that may have been reported in the past. Researchers at the National Office, using information collected from the regional, chapter, and national office files, are reviewing all previous inventories and available data on endangered flora and fauna, transcribing this information as well as detailed descriptions of habitat and map location where available. All information will then be computerized and included in the year-end report to the Weyerhaeuser Family Foundation.

But that won't be the end of it. An effort will be made to fill the gaps in the information collected for this inventory, and to generate comprehensive species inventories for all preserves. Where past or unconfirmed sightings of an endangered species have occurred, a new attempt at verification on a chapter level will be encouraged. In some cases professors at schools located near preserves, or local scientists or research groups will be invited by the chapters or preserve committees to study and monitor the species. Keeping tabs on endangered plants and animals is an important stewardship function which serves to afford continued protection against their possible extinction, as well as to increase our understanding of the role they play within their ecosystem. Funding from the Weyerhaeuser Family Foundation will be used to computerize much of the new information, and to cover costs related to manual file storage.

By 1982 the Conservancy will have the most comprehensive catalog ever of the elements of diversity on its preserves, and grants such as those from the Weyerhaeuser Family Foundation will have played an important part.

a tubular tongue used for extracting nectar from flowers. It was believed to be extinct and had not been sighted for 71 years. Three nukupuus were observed in the valley. The scientists also sighted three other birds that are on the international endangered species list: the crested honeycreeper, the Maui creeper, and the Maui parrotbill.

The Future

The plants and animals described in this article are only a sampling of the endangered and threatened species The Nature Conservancy has worked to save. But there are so many more that need help before they are gone, forever. Despite small remaining numbers of many of these rare species, it is not too late to save them, not if we care—if not for the flora and fauna, at least for ourselves. All forms of life are interrelated, interdependent, whether it's an appealing furry creature, a tiny orchid, or an uncommon fish. When one of these species becomes extinct, its eradication effects all life forms related to it, including, ultimately, *homo sapiens*.

Our own survival depends upon our willingness and ability to cooperate with our natural environment. As the most highly developed and omnipotent of earth's species, we have an obligation to protect those "lower" forms of life around us. In most cases, this can be accomplished by preserving and actively protecting habitats. It would be an outrage if we did not recognize that we share—and *must* share for our own well-being—this planet with other living creatures. If we act now to save our remaining plants and animals, we can, hopefully, prove Dr. Ripley's dire prediction false. But time is short—we may have as few as 25 years.

ENDANGERED:
The Endangered Species Act

by William J. Chandler, Legislative Liaison

Congress is presently considering proposals to weaken or eliminate one of the strongest laws now used by the federal government to protect threatened and endangered plant and animal species. Section 7 of the Endangered Species Act requires *all* federal agencies to insure that actions authorized, funded, or taken by them do not: (1) jeopardize the existence of threatened or endangered species; or (2) destroy or modify their critical habitats.

Some federal agencies responsible for the construction of large public works projects, such as dams, are finding Section 7 difficult to comply with when an endangered species "interferes" with a project. The current controversy surrounding the Act developed when a federal court ruled that the Tennessee Valley Authority (TVA) could not close the gates of the almost completed Tellico Dam on the Little Tennessee River, because the action would destroy the last known habitat of the Tennessee snail darter (*Percina tanasi*). Once prolific throughout the region, the fish's populations have declined greatly because numerous dams destroyed its habitats in other free-flowing streams.

The court also said that the dam could not be completed unless Congress altered Section 7; consequently TVA has pressed for such action. The Senate held four days of hearings on the matter in July, but made no decisions, while the House has commissioned a federal study to determine alternate uses for the river valley if the dam is not completed. (The study should be released by the time this issue is published.)

It is hazardous to predict what action Congress will take. Some congressional members definitely favor completion of the Tellico Dam. Furthermore, new pressures for legislation to revise Section 7 could arise if public works projects in other states are delayed.

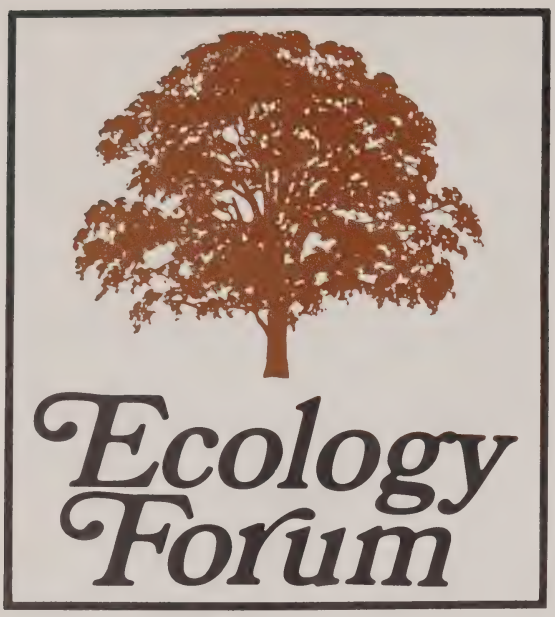
The Carter Administration, however, is in favor of leaving Section 7 unchanged. At the Senate hearings, Assistant Secretary of the Interior Robert Herbst testified that the Fish and Wildlife Service has conducted 4,500 consultations with federal agencies to determine if any of their activities may have potential adverse impacts on imperiled species. Of these consultations, only three led to court, and only one—the Tellico Dam controversy—was resolved unfavorably from the viewpoint of the federal agency involved. Consequently, Herbst said, Section 7 was working well and should not be altered.

Proponents who want the dam completed argue that it is needed for the development of an economically depressed region and that the project was underway before discovery of the snail darter. Moreover, they maintain that saving one fish species is an insignificant reason for stopping the project and that Section 7 should be amended to allow completion of the Tellico Dam.

If the Endangered Species Act is altered so that TVA can finish the dam, the new legislation might be written so as to apply to all similar public works projects that may adversely affect other endangered species. If this occurs, someone—possibly the Secretary of the Interior—would have to determine if a project's social and economic values are more important than the continued existence of a plant or animal. This would not really be a "choice" at all, since the "value" of a species may not always be known and, in fact, cannot be fairly compared to or weighed against the economic value of a project.

Our country's native species have already suffered a drastic decline in their populations because of our unplanned alteration of the natural land. The numbers of imperiled plants and animals grows yearly: as of July 31, 1977, 175 U.S. species of animals have been listed as threatened or endangered. Critical habitats have been proposed for 53 of these species, but only 8 have been finalized. Although 1,850 plants have been proposed for listing as threatened or endangered, only a few will be classified as such by the end of the year.

We *can* avoid exterminating species if we determine their existence, location, and status early in any development plan. In most instances we can find alternative sites for public works projects, or make project design modifications to protect a species. Such biologically oriented planning would not hinder our country's overall economy; indeed, it would work hand in hand with it. The irretrievable loss of species denies *real* benefits—ecological, scientific, educational, aesthetic, and economic—to current and future generations. Preserving the widest possible spectrum of plant and animal life is, therefore, a matter of prudent resource management. The works of man can be placed elsewhere; the works of nature cannot.



No. 25
by Robert E. Jenkins

"ENDANGERABLE" SPECIES

Preventing the extinction of endangered species is a legitimate concern and, along with ecosystem preservation and management, the Conservancy has made it a main objective of its activities. However, there are a great many species in the world, so that if we are to be effective we must come up with a list of the species most in need of attention and focus our limited resources on their protection.

The process of listing species associated with the Federal Endangered Species Program is, for a variety of reasons, excruciatingly slow. Thus the vast majority of endangered species of vertebrates and higher plants are not yet included on the official current list. On the other hand, some of the variously developed state lists have erred in the other direction by including species which are only pretty, popular, or unusual within a segment of their range. Though there may be legitimate reasons for interest in these species, they beg the question of endangerment. In some quarters there is a growing inclination to simply incorporate everything into the sphere of active concern, management, and manipulation, partly rationalized by the supposition that species not yet in trouble can be prevented from becoming endangered. In this mixture of shortfall and overkill, a lot of resources are apt to be misallocated with potentially serious results for the species that truly require our attention.

It is worth asking, then, whether extinction lies just around the corner waiting to pounce on any and all species, or whether, in fact, there are specific characteristics which predispose a species to become endangered. If so, it would be to our advantage to concentrate our resources on species that fit the prescriptions for endangerment and to allow the species endowed with a robust survivability to pursue their evolutionary courses without intervention. In fact, there are variable qualities in the biology of a species that make it more or less vulnerable, defining a spectrum from imminently imperiled to practically invulnerable. There are probably more factors involved than we can yet discern, but not overlooking the obvious seems immediately appropriate.

The main ingredient in species endangerability is rarity, but rarity itself comes in several forms. Some species are sparsely distributed over a wide geographic range, while others are rare because they are confined to only a few localities. Both forms of rarity can be endangering, depending on other variables.

In considering endangerability it is useful to subdivide the biota into opposing categories, plants vs. animals (and simultaneously producers vs. consumers), sedentary vs. mobile, and island vs. continental species. The special vulnerability of many of the species occupying islands is well known and its study is becoming nearly a fad among biogeographers. Unfortunately, that vulnerability has been amply demonstrated in the extirpation of large segments of island floras and faunas throughout the world. Yet even among island species, there are some which are relatively resilient, such as the coconuts and many sea birds with their tremendous dispersal powers. Individual island biotas can therefore be subdivided into typical relative spectra of fragile and resistant species.

Those continental species sharing an island-like pattern of distribution may be equally as vulnerable as those on real islands. Any habitat area surrounded by a "sea" of inhospitable habitat becomes an island for the species adapted to living in, and only in, it or similar areas. Many plant species and sedentary animals like amphibians and some fishes fall into this category. They are bound by their specializations or inability to disperse across intervening landscapes to other islands of suitable habitat. If there are very few such habitats, these organisms are rare and extremely endangerable, as a single malign event may wipe out the total species population. For mobile species, their island hopping ability makes them more resistant to destruction, but habitat specialization may still prove

their undoing if the destruction of suitable landspace becomes too pervasive.

For most animals, whether whales, moose, bison or mountain lions, large size is a contributing factor in endangerment. This is partly because the larger an animal is the less abundant it tends to be within a given habitat. The greater space requirements of large individuals makes them less tolerant of fragmentation of their habitat. Large animals are always among the first to disappear as human activities disrupt a given area. The size variable, however, plays no obvious role in plant endangerability. The coast redwood, for example, among the largest organisms on earth, is not a bit endangerable. In fact, it is nearly weedy within its range along the wet Pacific coast.

There are differences in plant and animal vulnerability largely because green plants are primary producers and, as such, have a larger energy pool to call on to support a larger total species mass. Animals are not only less abundant than plants of a comparable size, but, because of the loss of energy at each step in the food chain, their numbers decrease geometrically as one proceeds up food chains. Second and third order consumers are always rare. In any given community they are among the rarest of all organisms present, those requiring the greatest amount of territory to maintain themselves, the least tolerant of disruption affecting their food pyramid, and the ones with the smallest total populations. They also tend to be quite large, as predators must be able to subdue their animal prey. Taken together, these factors make them among the most extinction-prone of all organisms. In fact, almost all of the larger terrestrial predators in the world are endangered or threatened, and the remainder are sadly depleted.

Special vulnerability to toxic substances may be a critical attribute in species viability. Some plant species, like certain lichens and conifers, are particularly susceptible to nitrous oxides, ozone, or other airborne pollutants. The higher predators just discussed, as if they didn't have enough problems, suffer from the concentration of toxins as they proceed up the food chains. A prime example are birds of prey that accumulate high levels of pesticides in their body tissues. We are grateful for the existence of many of these intolerant species, because we monitor their condition to detect ambient environmental quality hazards to human health. But our concern here remains human health itself, and certain indicator species could easily be extirpated while we don our gas masks and gulp our bottled water.

Just as being an animal carries some inherent disadvantages from the point of view of viability, so too does being an aquatic organism. Aquatic ecosystems are sinks into which we pour all sorts of refuse and chemicals and which suffer from any type of development of land surrounding them. Since they occupy a fluid medium, aquatic species take the brunt of all sorts of environmental insults. In addition to the impact of pollutants, competition for water or direct water body modification may be imperiling factors. Again, other traits leading to endangerability have a combining effect here, because aquatic species occupying limited geographic ranges with few and specialized populations will be particularly vulnerable.

This treatment of factors leading to endangerability is necessarily sketchy but has covered most of the main variables. What then of the species which do not have these characteristics—those with large total ranges, uniform distributions, adaptability to varying habitats, good dispersal capacities, and high individual abundance? Even if environmental degradation should increase, it is likely that these species will, in nearly all instances, suffer least and be least needful of our assistance. Many of them will no doubt take a battering, but they can stand it better than the more endangerable species. In some cases, we have probably even enhanced their viability by breaking up large uniform populations into sub-populations through habitat fragmentation, thereby inadvertently encouraging genetic diversification and providing barriers to disease transmittal. In many cases such species probably have tolerances greater than our own, and barring the advent of an unforeseeable event, white oaks, red-backed salamanders, and robins will probably be here when we are gone.

A last point, in which we should take heart, is that we do have the ability to preserve species diversity. If only we pursue the objective intelligently and efficiently, there is no reason why we can't prevent the vast majority of potential extinctions in North America. The list of endangered species need not grow endlessly long, nor should we encourage inappropriate listings of species. There are simply a limited number of species with traits that make them endangerable. Even Noah, under the circumstances, didn't have to take the fishes aboard.

NEW CHAPTER ESTABLISHED

On September 17, 1977, the Board of Governors granted a full charter to the Maryland Chapter. Established as an Interim Chapter on April 14, 1976, the group has successfully accomplished the goals and objectives oulined in its operating plan for membership growth, fund-raising, acquisition, and stewardship.

NEW PROJECTS

Alaska

EAGLE RIVER (Borough of Anchorage). Acquired in a cooperative effort with the State of Alaska, the 300-acre area was one of the few privately owned properties remaining in the Chugach State Park. The park is forested with Alaska paper birch, poplars, and white spruce, and provides habitat for coyote, grey wolf, black bear, grizzly, brown bear, and moose. Running parallel to the Eagle River for six miles, the tract is essentially undisturbed. The land has been transferred to the state for administration by the Division of State Parks for inclusion and management in the Chugach State Park.

California

NORTHERN CALIFORNIA COAST RANGE PRESERVE — Addition — (Mendocino County). An American Land Trust project, the 40-acre addition contains the headwaters of Skunk Creek, a tributary of the Eel River, which supports the best community of slope redwoods in the preserve. The new tract is typified by second-growth Douglas fir and provides the southernmost extension of Olympic salamander habitat. Rich in scenic beauty, the 3,975-acre preserve, a National Natural Landmark, contains a full cross-section of the unspoiled vegetation and landscape of northern California's coastal range. The rugged, forested mountain land includes the entire undisturbed watershed of Elder Creek, which supports a great many diverse natural habitats. Management of the preserve is the responsibility of the Northern California Coast Range Preserve Stewards, the Northern California Chapter, and the California Field Office.

Connecticut

LUCIUS POND ORDWAY PRESERVE (DEVIL'S DEN)—Addition—(Town of Weston). The 6-acre addition is surrounded by 1,471 acres of land acquired by the Conservancy since 1966. One of the largest wild areas still remaining in southwestern Connecticut, Devil's Den encompasses the entire watershed of the Saugatuck River. The new tract not only completes preservation of the Ambler Brook watercourse, but also contains a bobcat den. The bobcat, *Lynx rufus,* has been proposed for classification as an endangered species. The preserve also harbors red fox, northern copperhead (uncommon), and Dutchman's breeches. Bird species include great blue heron, osprey, and great horned owl. Used for scientific research and nature study, Devil's Den is managed by the Conservancy's Devil's Den Committee. Funds to purchase the additional tract were provided by an anonymous donor.

Florida

BIG CYPRESS—Addition—(Collier County). Another 15 acres were purchased by the Conservancy for the National Park Service as an addition to the Big Cypress National Freshwater Reserve. To date, the Conservancy has acquired 666 acres towards creation of the Reserve, which is a major watershed supplying the vast Everglades National Park with a constant flow of vital water.

Georgia

PIGEON MOUNTAIN — Addition — (Walker County). 20 acres of the steep slopes of Pigeon Mountain and the mineral rights for 873 acres of the area have been acquired to add to Georgia's Pigeon Mountain Wildlife Management Area. Mountain streams and a forest comprised of oak, hickory, pine, and sweetgum provide habitat for a large number of native species. Containing caves, waterfalls, and magnificent rock formations, the area may serve as an aquifer recharge area for numerous hydraulic systems emanating from northwest Georgia.

SKY VALLEY (Rabun County). A portion of the Chattooga River, designated as a National Wild and Scenic River, runs through about 50 acres of the 861-acre property. The mixed hardwood and coniferous forest supports a wide diversity of flora, including 16 ferns, 6 orchids, 3 trilliums, and 8 violets. Plants considered rare or at the edge of their range include bloodroot, ginseng, soapwort, rich weed, and grass of Parnassis. Over 100 to 150 species of birds use the forest as year 'round residents or as migrating transients. Sky Valley will be transferred to the U.S. Forest Service for management and inclusion in the Chattahoochee National Forest.

Indiana

ANDERSON FALLS (Bartholomew County). Over 100 feet wide and 15 feet high, the falls on Clifty Creek are formed of famous Waldron shale. The shale was deposited during a geologic period of exceptional interest to scientists and is abundant in fossils. Huge blocks of Geneva dolomite form a bluff overlooking the fall's pool. The 44-acre area supports a large eastern deciduous hardwood forest, including a fine stand of mature beech, and extremely varied and abundant flora. The Indiana Chapter is fund-raising towards a campaign goal of $30,000, $25,000 of which has already been contributed by the Irwin-Sweeny-Miller Foundation. The area will be managed as a nature preserve of the Indiana Chapter.

KANKAKEE SWAMP WILDLIFE AREA—Addition—(Lake County). Extensive cattail and reed marshes remain from what was once a great swamp that has been largely drained over the last century. The Kankakee River runs for four miles along the south side of the preserve. Conveyed to the Lake County Park and Recreation Board, the 470-acre addition will be used as a wildlife preserve and recreation area. The refuge now contains 940 acres.

Minnesota

PEMBINA TRAIL—Addition—(Polk County). The additional 495-acre tract of native prairie provides critical habitat for the threatened greater prairie chicken. The land is comprised largely of gently rolling mesic to wet-mesic prairie with several sedge marshes and small aspen clones. Now containing 1,660 acres, the Pembina Trail Preserve is easily accessible to visitors. Numerous springs and seeps provide sites for the locally rare lady's slipper orchid and the grasslands contain the threatened white prairie fringed orchid. In addition to providing habitat for the prairie chicken, the wooded areas of the preserve support woodcock, roughed grouse and sharp-tailed grouse. The preserve is managed by the Conservancy's Minnesota Chapter.

COMPASS PRAIRIE PRESERVE (Nobles County). An area of approximately 14 acres, the prairie lies in the intensively farmed southwestern corner of Minnesota and is the largest remaining tract of native vegetation in the county. The tract contains two facing hillsides and a small interior valley. The eastern hillside is a fine mesic prairie with fertile clay soil and such characteristic plants as lead plant, blazing star, and big bluestem grass. The western hillside contains, in addition to other typical prairie species, oxytropis and the remarkable compass plant. The preserve is managed by the Minnesota Chapter.

New Hampshire

STAMP ACT ISLAND — Addition — (Carroll County). The Lake Wentworth Association, a project committee of the Conservancy, purchased the remainder of the 100-acre island in Lake Wentworth. Once the property of Governor John Wentworth (the last colonial governor of New Hampshire), the forested island is the home of a long-established great blue heron colony. The project committee will manage the area.

New York

CAMP RIVERDALE (Hamilton County). Situated on the northwestern shore of Long Lake, the prop-

erty contains a diversity of habitats, including a sandy beach, alder swamp and upland, and a mixed forest of poplar, birch, white pine, and red maple. The 89-acre tract also contains the outlet into Long Lake, which originates from the three Anthony Ponds. This area provides a spawning place for pike and a rest-stop for many species of migratory birds. Other animals found in the swamp include fisher, martin, deer, beaver, bear, shrew, otter, mink, weasel, muskrat, and bobcat. Acquired in cooperation with the Department of Environmental Conservation, the refuge will be transferred to to the State of New York for administration by the Department. It will be included in the Adirondack Forest Preserve.

GRIFFITH PRESERVE — Addition — (Suffolk County). A gift of Eleanor B. Griffith, the 2-acre addition brings the preserve to 17 acres. The area contains an exceptionally fine example of hardwood forest, once abundant on the South Shore, with some trees estimated to be several hundred years old. The preserve is managed by the Long Island Chapter.

McGREGOR POND PRESERVE—Addition—(Westchester County). Donated by the Mohegan Colony Associates, the 10-acre tract, although not contiguous to the Conservancy's 9-acre parcel, is integral to the overall assemblage of a larger preserve. The property of red maple swamp will serve as a buffer for the unpolluted pond and the relatively undisturbed natural land surrounding it. Open to the public for hiking, research, and educational visits, the preserve is managed by the Lower Hudson Chapter.

WADING RIVER MARSH PRESERVE—Addition—(Suffolk County). Bounded on the south and east by land already owned by the Conservancy, and on the north by the Wading River, this 4-acre tract consists entirely of salt marsh. It was donated by Mr. Pickford L. Robinson. The salt marsh vegetation includes marsh grasses and marsh elder. Clapper rails, herons, spotted sandpipers, sharp-tailed sparrows, and least and common terns are some of the birds that frequent the area. The Wading River Marshes have been given a number two priority rating in the National Park Service's National Natural Landmark Atlantic Coastal Plain Theme Study. Cited as being one of two remaining significant salt marshes on the north shore of Long Island, the 63-acre preserve is managed by the Long Island Chapter.

North Carolina

GREEN SWAMP (Brunswick County). The Federal Paper Board Company, Inc., donated 13,850 acres of the Green Swamp to the Conservancy. An American Land Trust project, the tract is the most biologically significant portion of the swamp, and has been designated a National Natural Landmark by the National Park Service. An unusual mosaic of wetland vegetation communities, the area supports 5 endangered or threatened plant species, 12 species of rare and unusual plants, and 14 species of unique insectivorous plants. One of the most notable is the Venus' flytrap (*Dionaea muscipula*), which has highly modified, hinged leaves that trap insects and even small frogs. It is protected by state law. Other state endangered or threatened flora include the sweet pitcher plant, swamp tickweed, sneezeweed, and yellow fringeless orchid. Green Swamp also harbors threatened alligator, state endangered Eastern diamondback rattlesnake, and rare black bear. Several sightings of the endangered Eastern cougar also have been reported. Valued at up to $3.5 million, the area will be looked after by local Conservancy volunteers until the best management agency can be determined.

ROAN MOUNTAIN—Addition—(Avery County). Another 179 acres of the mountain's lush meadows of rhododendron and flaming azalea have been acquired and preserved in a cooperative effort with the U.S. Forest Service under the auspices of the American Land Trust. The addition is particularly unique for its grassy balds, which are characteristic of the Roan Highlands. Although the balds are now shrinking in size, proper man-

Here is a list of my friends who would appreciate hearing of your efforts.

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

Name _____ (please print)

Address _____

City _____ State _____ Zip _____

Enclosed is my contribution of $ _____ to the General Fund of The Nature Conservancy.

Name _____

Address _____

City _____ State _____ Zip _____

Contributions are tax-deductible. Please make checks payable to The Nature Conservancy. Your cancelled check is your receipt.

What we have saved and what we will save in the next few years will be all that will remain to be passed on to future generations.
There will never be another chance.

Your stamp on this envelope is an additional contribution to the Conservancy.

FIRST CLASS
Permit No. 1585
Arlington, Va.

BUSINESS REPLY MAIL

No Postage Stamp Necessary if Mailed in the United States

Postage will be paid by

The Nature Conservancy

1800 NORTH KENT STREET
ARLINGTON, VIRGINIA 22209

agement of the fragile environment will protect them. The area is habitat for mountain wildlife such as bear and bobcat, both increasingly rare species. Bringing the size of the present refuge to 2,559 acres, the area will be included in the Pisgah National Forest, which is managed by the Forest Service.

Oregon

CAMASSIA NATURAL AREA — Addition — (Clackamas County). The 5-acre addition will provide access and parking for the preserve, as well as an important buffer against adjacent residential areas of West Linn. Located 15 miles from Portland, the preserve's wildflower meadows of fawn lily, camas, brodiaea, cluster lily, kinnikinnic, dwarf huckleberry, quaking aspen, and meadow sidalcea are interspersed with forested areas containing oak, madrone, grand fir, and Douglas fir. The area contains an excellent record of the late Pleistocene Missoula Flood, exhibiting completely scabbed areas, channels, and depressions. Also enhanced by many natural rock gardens that support gold-back fern, selaginella, and mosses, the preserve presently contains 28 acres. A fund-raising drive for $15,000, undertaken by the Conservancy's Northwest Office, the Oregon Chapter, and the Camassia Committee, has been completed. The addition will be leased with the existing preserve to Lewis and Clark College for management.

COX ISLAND (Lane County). Donated by Champion International via the American Land Trust, Cox Island contains one of the largest undisturbed immature high marshes on the Oregon-Washington coast. The 187-acre island is dissected by a maze of tidal channels, salt pans, and tidepools. Its adjoining expanses of mudflats are crucial year 'round feeding grounds for great blue herons from a nearby 100-nest rookery. Adjacent tidelands also invite over 80 other species of birds, including pintail duck, marsh hawk, osprey, peregrine falcon (an endangered species), common egret, Wilson's phalarope, whimbrel, willet, dunlin, short-billed dowitcher, plover, American bittern, rail, hermit warbler, marsh wren, and red-winged blackbird. Softshell clams and shrimp are abundant, and sole and starry flounder feed in the channels during high tides. Beaver, river otter, muskrat, and mink reside on the island, and deer, harbor seal, and raccoon are visitors. Lying in the Siuslaw River, Cox Island will be managed by a local volunteer committee under the supervision of the Conservancy's Northwest Field Office.

Pennsylvania

TINICUM NATIONAL ENVIRONMENTAL CENTER—Addition—(Delaware County). Ac-

quired for inclusion in the federal wildlife refuge, the 2-acre tract was donated to the Conservancy by Sun Mark Industry. It is a tidal marsh characterized by marsh grasses. The property has been transferred to the U.S. Fish and Wildlife Service, managers of the Environmental Center.

South Carolina

FRANCES BEIDLER FOREST (Four Hole Swamp)—Addition—(Berkeley County). The 90-acre property serves as a buffer and access to the forest and constitutes a very important portion of the swamp itself. Offered to the Conservancy at a bargain sale price by the Georgia-Pacific Corporation, funds for the purchase will be provided through an American Land Trust fund-raising effort in cooperation with the Garden Clubs of South Carolina. Predominant species in a 20 to 30-acre forest on the new tract include sweetgum, tupelo gum, white oak, maple, and poplar, with many cypress seedlings. The water system associated with the area is a prime example of blackwater swamp. Managed by the National Audubon Society, the Frances Beidler Forest is perhaps the last significant remnant of the coastal plain of South Carolina and the original old growth bald cypress forests that were once a common and important ecosystem of the Southeast. The sanctuary, a National Natural Landmark, now contains 3,505 acres.

South Dakota

CLOVIS PRAIRIE (Brown County). A gift of Mr. Hall H. Clovis, the 156-acre area is a tall-grass prairie dominated by big bluestem. The property will be managed by personnel of the nearby Sand Lake National Wildlife Refuge.

Vermont

SUGAR HOLLOW NATURE AREA—Addition—(Rutland County). Sugar Hollow Brook runs through the 20-acre tract, half of which is swamp. The rest of the land includes open fields, rocky ledges, and slopes covered with hardwood trees. Managed by the Sugar Hollow Preserve Committee and the Vermont Chapter, the preserve now contains 51 acres. The committee and the chapter are fund-raising for $15,500 to complete the project.

Virginia

RAGGED ISLAND (Isle of Wight County). Identified as a critical natural area by the Smithsonian Institution's Chesapeake Bay Inventory, the 1,475-acre island contains 305 acres of timbered highland, with the balance of the property in marshland. It has approximately four miles of shoreline on the James River and one mile of bay cove shoreline on Ragged Island Creek. The needlerush and cordgrass marshes, interspersed with small, high pine islands, support many species of migratory waterfowl, saltwater and brackish water fish, oysters, and crabs. Muskrat, mink, raccoon, otter, and deer inhabit the uplands. Ragged Island will be transferred or leased to the State of Virginia's Commission of Game and Inland Fisheries for preservation as a wildlife management area.

WILDCAT MOUNTAIN—Addition—(Fauquier County). Lying in the foothills of the Blue Ridge Mountains, the 20-acre tract is a mixed hardwoods forest that includes trees common to the central Appalachians. Wildlife includes deer, wild turkey, and ruffed grouse. Wildcats still prowl the mountain slopes. The preserve now totals 653 acres—the first 633 acres were donated by Mr. and Mrs. Russel M. Arundel. Management of the area will be the responsibility of the Conservancy's Wildcat Mountain Preservation Committee of the Virginia Chapter, which is also fund-raising to complete the project.

Washington

CYRUS GATES MEMORIAL PRESERVE (Watcom County). Donated by Mr. Cyrus K. Gates and Mrs. Francis Gates McCord, the preserve is an entire, undisturbed, pristine 5-acre island. Locally known as Dot Island, it lies in Chuckanut Bay, about a half-mile from the City of Bellingham, where it is protected from human impact. Forested predominantly with Douglas fir, western hemlock, and red cedar, the little island is a refuge for raptors such as the threatened northern bald eagle and a variety of shorebirds, including gulls, herons, loons, and cormorants. The forest's understory contains ocean spray, salal, and sword fern. The preserve has been leased to Western Washington State College for use in tidal research and scientific educational programs.

West Virginia

COAL RIVER (Kanawha County). An area of 735 acres, the property consists of about 100 acres of river frontage and approximately 635 acres of mixed pines and hardwoods. It contains a man-made pond and is adjacent to the Upper Falls of Coal River. The West Virginia Heritage Trust Program has identified a plant, Guyandotee Beauty (*Synandra hispidula*), which is on the Smithsonian's proposed list of threatened plant species, in the vicinity and believes that it may also occur within the boundaries of the preserve. The plant is known to occur in only five other areas of West Virginia. Within two years, the area will be transferred to Kanawah County for use as a natural area park.

HUNGRY BEECH PRESERVE — Addition — (Roane County). The 102-acre addition contains the rare Adam-and-Eve or putty root (*Aplectrum hyemale*), a member of the orchid family. Lying almost entirely within a steep-sided cove, which is located between two ridges protruding from Paxton Ridge, the preserve contains forest communities of cove hardwoods and white oak and rolling meadows. The West Virginia Chapter is raising $29,050 for the property and its stewardship, and will also be responsible for management. Also, the West Virginia Garden Club, Inc., is seeking funds for the project from its members. The 119-acre preserve is an American Land Trust project.

The American Land Trust

"ALTAMAHA SPLASH"

By Lynn Mohn

Franklinia, where are you? In 1765, John Bartram, the great American botanist from Philadelphia, and his son William discovered a beautiful shrub with camellia-like blossoms growing along Georgia's Altamaha River. But, in 1803, John Lyons, another botanist, was the last person to see the plant in the wild. Although *Franklinia alatamaha* survives in cultivation, thanks to the Bartrams, scientists still fuss over its fate and mysterious origins.

The suspected site of the Bartram discovery may be contained within the 1,331 acres of forest and swamp along the Altamaha recently donated by ITT Rayonier Inc. to the Conservancy under American Land Trust auspices. The Altamaha is the largest river basin on the southeastern Atlantic seaboard. Valued at $200,000, the donated riverbank stretches for 24 miles from Doctortown to Fort Barrington, the vicinity of the Bartram find.

Governor George Busbee of Georgia announced the gift, praising ITT Rayonier, a forest products manufacturer, for its foresight and generosity. "This outstanding gift," he said, "is a superb example of how American business can make a lasting contribution to conservation." The property will be transferred to the state for low intensity recreational use. Busbee also thanked the Conservancy for its "invaluable assistance" and "continuing effort to protect vital pieces of our natural heritage." *The Atlanta Journal* commended the transaction in an editorial entitled "Altamaha Splash."

The corporate community continues to be attracted by the special opportunity to participate in land preservation offered through the two-year American Land Trust program. Kimberly-Clark, a major consumer, paper, and forest products manufacturer, joined the growing list by donating 3,000 acres of Appalachian Mountain woodlands valued at over $700,000 in east Tennessee. The property, known as Bumpass Cove, is the site of a wildlife management area 15 miles southwest of Johnson City near Erwin. White-tailed deer, raccoon, the red and gray fox, striped skunk, bear, and wild turkey are all residents of Bumpass Cove. Plans call for the state Wildlife Resources Agency to take on management responsibility for the preserve.

Another major firm, E. I. du Pont de Nemours & Company, has announced its support of the Trust with a contribution of wetlands and high ground north of Huron, Ohio. The 105-acre du Pont area harbors four endangered species of fish—spotted gar, black-nose shiner, pugnose minnow, and banded killifish. The property will be leased and later transferred to the Ohio Division of Natural Areas and Preserves.

In the wilderness near Mountain Home, Idaho, some spectacular high rock cliffs rise above the Snake River to shelter the world's largest concentration of nesting birds of prey. After two years of negotiation, the Conservancy secured options on three private inholdings within the Bureau of Land Management's 36,000-acre Birds of Prey Natural Area. The optioned tracts combined amount to about 500 acres and 3 miles of riverbank, but are scattered along a 30-mile stretch of the Snake—in strategic spots where prairie falcons, golden eagles, and ferruginous hawks raise their young. In a joint effort with the Trust, the Conservancy has launched a $350,000 fund-raising campaign to cover purchase costs and management of the land.

In South Carolina, a search for $15,000 has begun in the wake of a bargain sale from Georgia-Pacific Corporation. The property, valued at over $50,000, is a 90-acre addition to Four Hole Swamp (Frances Beidler Forest) and will expand this exceptional virgin blackwater cypress swamp, one of the last in the southeast.

The National Council of State Garden Clubs program now has $170,000 in donations to its credit. Armed with regional slide shows created by the Trust, National Council's state federations have embarked on an autumn effort to carry the Trust message to their clubs and local community groups on behalf of all joint Trust/National Council fund-raising projects.

To date, some 70 significant natural areas in nearly every state have become part of the land legacy which it is the American Land Trust's mission, with primary support from The Nature Conservancy, to leave to those who will outlive us.

NOTE: New Brochure: The Trust has published a new brochure, "What Business and Individuals Are Doing to Save Our Natural Heritage." The brochure is available from the Trust. *Holiday Idea:* Give a meaningful, timely gift this holiday season. Make your friends and loved ones Honorary Trustees of the American Land Trust. A card announcing your gift, a personalized certificate suitable for framing, and a year's membership in The Nature Conservancy (plus the *News*!) will go to the individual you designate. *Address:* American Land Trust, P.O. Box 2076, Arlington, VA 22202. Executive Director: George S. Wills. Phone: (703) 841-5376. Donations are tax-deductible. Please make checks payable to The Nature Conservancy.

OAK LEAF AWARDS 1976

Each year The Nature Conservancy acknowledges the outstanding efforts of its members and volunteers through the presentation of the Oak Leaf Award. This award, symbolized by a green and gold lapel pin, is given in recognition of especially dedicated service and support toward achieving the Conservancy's objectives.

Gordon Alcorn has been described by his peers as "a voice in the wilderness for 35 years." Author of over 100 articles on wildlife and Editor-in-chief for 26 years of *The Murrelet,* he is best known for helping to save the Nisqually Delta and has worked diligently to preserve Protection Island, Waldron Island, Goose Island, Mima Mounds, and Foulweather Bluff Preserve. Dr. Alcorn has served as Co-chairman and then Chairman of the Western Washington State Chapter and guided the Chapter during its most successful period of growth.

James R. Anderson has left an indelible mark on land and wildlife conservation through his generous gift of Meredosia Island, Illinois—the largest single donation made by an individual in the state. Under his leadership, the Illinois Chapter has almost doubled its membership and undertaken progressive programs in stewardship and acquisition.

Ann Carl has served three active terms on the Board of Trustees of the Long Island Chapter and has been Secretary of the Chapter for a number of years. In addition to editing the magazine *Sanctuary* for the past 10 years, Mrs. Carl regularly contributes articles on land-use and conservation in the *New York Times, Newsday,* the *Suffolk Times,* and the *Long Island Commercial Review.*

Edward Clements has served the Eastern New York Chapter in numerous capacities since the Chapter's inception 23 years ago. He was a member of the first Board of Trustees, then Chairman, and later Secretary and Treasurer. His inexhaustible energy and expert financial skills made it possible to acquire and preserve Little Bear Swamp, now a National Natural Landmark, and Barberville Falls Preserve. For several years, Mr. Clements has contributed proceeds from an innovative paper recycling project to the Chapter Acorn Fund.

Elizabeth Conant receives her Oak Leaf Award for her single-handed efforts to preserve a key natural area along the Ivy Creek in Charlottesville, Virginia. She organized a management committee, secured interim financing, worked to obtain BOR matching funds, and convinced the city and county to purchase the land from the Conservancy for use as a natural area park.

R. Eugene Curry, for the past 20 years, has served as a Trustee, as Vice Chairman, and recently as Chairman of the Mianus River Gorge Conservation Committee, the pioneer project of the Conservancy. Dr. Curry receives his Oak Leaf for major contributions in the areas of fund-raising, acquisition, and efforts to protect the Mianus River watershed in New York.

Barbara Horton has donated 10 years of spirited and creative leadership to the Conservancy's endeavors in California. Past Chairwoman of the Southern California Chapter, she raised all the funds for the Dorland Preserve, and secured most of the funds for the Oasis De Los Osos and Morongo Canyon Preserves. She has initiated the annual chapter meetings and promoted community involvement through such projects as art shows, music recitals, and tours of Conservancy preserves for urban children.

Lloyd C. Hulbert was instrumental in identifying and helping to acquire Konza Prairie. Since the early 1960's, he has been the Conservancy's guiding force in Kansas, organizing stewardship activities and personally compiling the Kansas Conservancy newsletter. He was instrumental in acquiring the Flint Hills Tallgrass Prairie and the Dingus Natural Area. Dr. Hulbert is Professor of Biology and Plant Ecology at Kansas State University.

Roger Q. Landers, Jr., Chairman of the Iowa Chapter from 1974 to 1977, has also been successful in marshaling Chapter stewardship efforts throughout the state. He organized the Midwest Prairie Conference in 1976 and is a member of the Governor's Committee on Conservation of Outdoor Resources in Iowa. Author of numerous articles, Dr. Landers is Professor of botany and plant pathology at Iowa State.

Ralph W. Lucas has criss-crossed the State of Missouri, traveling over 25,000 miles by car, to identify key natural areas and to give slide presentations in remote parts of the state. Under his leadership as immediate past President of the Chapter, and Chairman of the Acquisitions Committee, the Missouri Chapter has greatly increased its membership, acquisitions, and stewardship programs. Mr. Lucas is especially recognized for the role he played in the preservation of Mt. Vernon Prairie.

Louis Arthur Watres III, a number of years ago, established the Lake Lacawac Sanctuary Foundation, to which he donated a 363-acre preserve that is used by students and researchers from throughout Pennsylvania. Subsequently, he became founder and first Chairman of the Conservancy's Northeastern Pennsylvania Chapter. He presently chairs the management committee of the Lacawac Sanctuary, now a Conservancy model preserve. Mr. Watres is also actively involved in the Virgin Islands Conservation Society.

PRESIDENT'S STEWARDSHIP AWARDS

Once a year the Conservancy recognizes an individual and a committee for significant work in advancing the art and science of stewardship on Conservancy preserves.

Dr. Frank Irving, Chairman of the Minnesota Chapter Stewardship Committee, has been instrumental in developing the Minnesota Chapter's grassland management program. But more significant, his contribution in developing effective structures and policies for preserve stewardship in Minnesota has brought us closer to a full understanding and appreciation of the best means by which we can properly safeguard our treasured natural areas.

The Black Pond Stewardship Committee in Norwell, Massachusetts, has worked diligently in preparation for the re-opening of Black Pond in 1978. It has physically restored the preserve, cultivated public interest in the area, and raised funds and general support.

ANNUAL CHAPTER AWARD

The Board of Governors has established an annual award to recognize chapters that make outstanding contributions toward the accomplishment of Conservancy objectives.

The Indiana Chapter has been selected by the Board of Governors as the Conservancy's most outstanding chapter of 1976. The award is presented to Indiana volunteers and staff for the most improved performance and current outstanding performance in acquisition of high quality natural areas, membership development, stewardship, scientific and educational programs, public awareness, and publications.

PHOTO CONTEST WINNERS ANNOUNCED

Winners of the Conservancy's preserve photography contest, which was open to all chapters, were announced at the Annual Meeting in Charleston, South Carolina. A panel of judges reviewed all entries of slides depicting chapter projects with accompanying scripts and selected the following winners: first place, the Illinois Chapter; second place, the West Virginia Chapter; and honorable mentions, the Southern California and Lower Hudson Chapters. All slides entered in the contest were shown to Conservancy members on October 21 at the Mills Hyatt House. A representative from each of the winning chapters presented their photographs and scripts and accepted their awards —mounted enlargements of one of the chapter's slides.

DAYTON AND MORINE WIN AMERICAN MOTORS AWARDS

The Conservancy is pleased to announce that David E. Morine, Vice President for Land Acquisition, received an American Motors Conservation Award in the professional category for his "business acumen—his innovative approach and imaginative answers to seemingly insurmountable financial questions and negotiating positions—" in supervising over 200 land acquisition projects a year. Another American Motors Conservation Award, in the non-professional category, went to Wallace C. Dayton, past chairman of the Conservancy's Board of Governors and a trustee of the Minnesota Chapter. Mr. Dayton was recognized for his life-long dedication to the cause of conservation.

ANNUAL MEETING HELD IN CHARLESTON

By Thomas M. Beers

Mr. Beers is a member of the Conservancy and one of the founders of the Maryland Chapter. A retired Vice President of the National Geographic Society, he now serves on the Conservancy's staff as Director of Membership Development. The following is his account of the Conservancy's Annual Meeting.

Over 300 members attended the Conservancy's Annual Meeting in Charleston, South Carolina, October 20-22, and we had a wonderful time. The three days offered a smooth mix of field trips to nearby Conservancy preserves, tours of the historic city, and pleasant social evenings—all in perfect weather.

After registration on Thursday morning, the buses pulled up in front of the Hyatt House, and we took off for various field trips. One group visited Capers Island and toured the South Carolina Marine Resources Center. A second troop toured Charleston on foot. Our group boarded blue buses for Four Hole Swamp in Frances Beidler Forest. The greatest attraction there was a self-directed tour of the boardwalk—a mile of it, winding through an incredibly thick, wet forest. The swamp swallowed us up! Though there were about 80 people, Mary and I walked alone, through a silence broken only by a screaming red-shouldered hawk, a kingfisher, and a few warblers in the treetops. The cypress, tupelos, and swamp oaks were majectic, towering high above the boardwalk and filtering the bright sunlight.

That afternoon we took the walking tour of Charleston, an animated history lesson. In the evening South Carolina Governor James Edwards welcomed us to the Palmetto State, and the Conservancy's national awards were presented. (See pages 28-29).

The next day at the Santee Coastal Reserve, expert guides on each bus showed us the sanctuary's wonderfully varied plant life—different in each part of the reserve—including unique bug-catching pitcher plants. We walked along the dikes and saw the ingenious seagates used to control the water level in an area that was once primarily rice fields. (I had always thought that cotton was king in the colonial South.) Some of us saw ospreys, marsh hawks, and unusual Mississippi kites.

You might suspect that after these great excursions the Annual Meeting would be pretty thin soup. Not at all. The high point of the weekend was on Saturday morning when Pat Noonan presented a slide show on the Conservancy's accomplishments with a running commentary. The entire event was optimistic, filled with pride and confidence in our accomplishments and in our ability to handle the huge tasks that lie ahead. We all left with increased faith and confidence in our organization. (Can't wait for the next meeting.)

NEW LIFE MEMBERS

An individual becomes a Life Member of The Nature Conservancy upon contribution of $500 for membership dues. The contribution is added to the Guarantee and Income Fund for the Conservancy's endowment.

Mr. J. Richard Andrews
Tennessee

Mr. Thomas L. Archibald
Connecticut

Dr. Ira L. Baldwin
Wisconsin

Mrs. Ivy Neal Balsom
Wisconsin

Mrs. Alfred W. Childs
California

Mrs. H. William Close
South Carolina

Mrs. Claire L. Egtvedt
Washington

Mr. John Fahning
Minnesota

Mr. Francis Goelet
New York

Mr. Larry A. Haskin
Missouri

Mr. Pembroke S. Huckins
Maryland

Ms. Mavis Kelsey, Jr.
Texas

Dr. Donald Kindschi
Wisconsin

Mrs. Hallam J. Koons
Pennsylvania

Mrs. Joseph Mares
Texas

Mr. David Hunter McAlpin
New Jersey

Richard M. and Lucia W. Rennard, Jr.
New Jersey

Mr. James I. Richardson
Georgia

Mrs. Paul Squibb
California

Mr. E. Hadley Stuart, Jr.
Idaho

Mrs. Edmund White
Texas

Mr. Thomas Wiancko
Wyoming

Mr. Robert Winthrop
New York

NEW CORPORATE ASSOCIATES (ANNUAL $1,000 MINIMUM)

AMTROL, Inc.
Rhode Island

American Telephone & Telegraph Company
New York

International Telephone and Telegraph Corporation
New York

The Mead Corporation Foundation
Ohio

The Quaker Oats Foundation
Illinois

The Travelers Insurance Companies
Connecticut

RENEWING CORPORATE ASSOCIATES

Atlantic Richfield Company (3rd year)
California

Mt. Haggin Livestock, Inc. (2nd year)
Montana

Dow Chemical Company (4th year)
Michigan

THE NATURE CONSERVANCY

NON-PROFIT ORG.
U.S. POSTAGE
PAID
PERMIT NO. 9388
WASHINGTON, D. C.

Regional, Field, and Chapter Offices:

Eastern Regional Office
294 Washington Street, Room 850
Boston, Massachusetts 02108
(617) 542-1908

Southeast Regional Office
148 International Blvd., N.E.
Suite 450
Atlanta, Georgia 30303
(404) 659-0240

Midwest Regional Office
328 East Hennepin Avenue
Minneapolis, Minnesota 55414
(612) 379-2134

Western Regional Office
425 Bush Street, 5th Floor
San Francisco, California 94108
(415) 989-3056

New York Development Office
36 West 44th Street, Room 307
New York, New York 10036
(212) 869-9532

Mid-Atlantic Field Office
1800 North Kent Street
Arlington, Virginia 22209
(703) 841-5300

Oregon Field Office
1234 N.W. 25th
Portland, Oregon 97210
(503) 228-9561

Minnesota Field Office
328 East Hennepin Avenue
Minneapolis, Minnesota 55414
(612) 379-2134

Indiana Field Office
Route 1, Box 155
Nashville, Indiana 47448
(812) 988-7547

Northwest Field Office
1234 N.W. 25th
Portland, Oregon 97210
(503) 228-9561

Michigan Field Office
Suite F, 531 North Clippert Street
Lansing, Michigan 48912
(517) 332-1741

Ohio Field Office
1504 West 1st Avenue
Columbus, Ohio 43212
(614) 486-4194

Rocky Mountain Field Office
820 Sixteenth Street, Suite 420
Denver, Colorado 80202
(303) 623-8088

Hawaii Field Office
P.O. Drawer 4528
Honolulu, Hawaii 96813
(808) 531-0408

North Carolina Field Office
P.O. Box 805
Chapel Hill, North Carolina 27514
(919) 967-1406

Connecticut Chapter
Science Tower, Box MMM
Wesleyan Station
Middletown, Connecticut 06457
(203) 344-0716

Long Island Chapter
P.O. Box 72
Cold Spring Harbor, New York 11724
(516) 367-3225

Maine Chapter
51 Chapel Street
Augusta, Maine 04330
(207) 622-3101

Eastern New York Chapter
P.O. Box 22
Altamont, New York 12009
(518) 861-6860

Illinois Chapter
666 N. Lake Shore Drive
Suite 1919
Chicago, Illinois 60611
(312) 787-1791

THE NATURE CONSERVANCY

Land conservation through private action.

National Office
1800 North Kent Street
Arlington, Virginia 22209
(703) 841-5300

Address Correction Requested

[illegible] ST
NEW LONDON CT 06320